

1                                    S P E C I F I C A T I O N

2                                    INLINE SKATE BRAKE

3                                    CROSS-REFERENCE TO PRIOR APPLICATIONS

4                    Provisional applications on the subject invention were filed  
5                    on January 27, 2003, assigned Serial No. 60/443,265. and May 5,  
6                    2003, and assigned Serial Nos. 60/467,296.

7                                    BACKGROUND OF THE INVENTION

8                    The field of the invention is inline skate brakes and the  
9                    invention relates more particularly to inline skate brakes of the  
10                   type which use a "diabolo." The term "diabolo" is intended to  
11                   mean a roller which has two halves and a center portion with a  
12                   reduced diameter. A typical diabolo used on an inline skate is  
13                   shown in Figure 2 of U.S. Patent No. 5,938,213. As the diabolo  
14                   is brought into contact with a wheel or two wheels, the two  
15                   halves of the diabolo, referred to in the '213 patent as disks,  
16                   move outwardly so that their outer surface rubs against the  
17                   chassis, causing a braking action.

18                   Another diabolo as shown in U.S. Patent No. 5,895,061 which  
19                   refers to a brake having a pair of disks 9. The disks 9 have a  
20                   frusto conical face facing the wheels 11 and diabolos are held  
21                   away from the wheels by a spring 13. When the disks 9 come into

1 contact with the wheel, they are moved apart and pressed against  
2 the arms of lever 11. U.S. Patent No. 5,639,104 shows a skate  
3 brake which has a diabolo with frusto conical disks, shown for  
4 instance in Figures 2, 3, 4, and 5.

5 U.S. Patent No. 6,065,751 shows a cylindrical braking wheel  
6 which contacts the outer surface of one or more of the wheels of  
7 an inline skate.

#### 8 BRIEF SUMMARY OF THE INVENTION

9 The present invention is for a brake assembly for inline  
10 skates which have a frame supported by a boot portion. The frame  
11 has a right and left downwardly directed frame member. The frame  
12 holds at least three axles, and usually four, for supporting  
13 wheels. A preferred version of the brake assembly has a right  
14 and a left carrier plate positioned along a portion of the inner  
15 face of the downwardly directed frame members. Each downwardly  
16 directed frame member has an inwardly directed protrusion around  
17 each axle opening, which abuts the wheel bearing of each wheel  
18 and holds the wheel away from the frame. A right and a left  
19 carrier plate is positioned along a portion of the inner face of  
20 the frame. The carrier plate has elongated openings which are  
21 positioned over the bearing supporting protrusions of the frame.  
22 The carrier plate can move back and forth, up and down, or at an

1 angle depending upon the shape of the elongated openings. The  
2 carrier plates hold a plurality of diabolos. The diabolos do not  
3 contact the wheels when the carrier plate is in a disengaged  
4 position and contact the wheels when the carrier plate is in an  
5 engaged position. Means are provided for movably controlling the  
6 position of the carrier plate, preferably by use of a collar  
7 around the ankle of the boot.

8 A preferred configuration of diabolo is a single diabolo  
9 having a curved recess, although two separated disks can be used.  
10 The preferred diabolo has an elastic portion so that when it  
11 contacts a wheel, it stretches outwardly and its outer faces  
12 contact the carrier plate to provide a braking action.

#### 13 BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

14 Figure 1 is an exploded perspective view of the underside of  
15 an inline skate showing the frame of the skate and the pair of  
16 carrier plates. The carrier plates are shown as supporting a  
17 plurality of diabolos.

18 Figure 2 is a side view of an inline skate having a skate  
19 brake of the present invention having vertically oriented  
20 openings.

1           Figure 3 is a side view of an inline skate having the skate  
2 brake of the present invention having horizontally oriented  
3 elongated openings.

4           Figure 4 is a side view of two wheels having a diablo held  
5 on a pair of pivoted levers therebetween.

6           Figure 5 is a cross-sectional view of a diablo useful with  
7 the present invention.

8           Figure 6 is an end view of the diablo of Figure 5.

9           Figure 7 is a side view of an alternate configuration of the  
10 diablo useful with the brake of the present invention.

#### 11                   DETAILED DESCRIPTION OF THE INVENTION

12           An inline skate is shown in perspective view in Figure 1 and  
13 indicated generally by reference character 10. Inline skate 10  
14 has a boot portion 11 with a frame 12 affixed to the bottom  
15 thereof. Frame 12 has a right downwardly directed frame member  
16 13 and a left downwardly directed frame member 14. Each of the  
17 right and left frame members have four axle openings 17 for  
18 supporting wheel axles. Each axle opening has an inwardly  
19 directed bearing supporting protrusion 15. Each protrusion 15  
20 has an outer dimension indicated by the arrow 16. Each axle  
21 opening is indicated by reference character 17.

1           A right carrier plate 18 and a left carrier plate 19 each  
2     have two elongated openings 20. Each elongated opening has a  
3     major dimension 22 and a minor dimension 21. The minor dimension  
4     21 is about equal to the outer dimension 16 of protrusion 15. In  
5     this way, each carrier plate can slide along the elongated  
6     openings back and forth or up and down or at an angle while  
7     being guided by contact with the protrusions 15. A spoke 9 can  
8     function either as a tension member or as a force applying  
9     member. In Figure 1, it functions in both forms since when  
10    collar 37 moves forward, spoke 9 pushes the carrier plates  
11    forward through bolt and nuts 8. The spoke 9 may be adjustable  
12    by turning wing nut 7 or other conventional adjustment means such  
13    as that shown in Fig.4. It is contemplated that a TEFLON or  
14    other high slip polymer ring could be placed around the  
15    protrusions 15 to reduce friction and wear between the carrier  
16    plates and the protrusions. The carrier plates 18 and 19 are  
17    preferably steel having a thickness of only about 0.028. In this  
18    manner, they fit within a conventional frame and require very  
19    little change in design or appearance of the frame.\*\*\*\*\*

20           In one configuration diabolo 23 has a separate right half 24  
21    and a left half 25. The face of the right and left halves 24 and  
22    25 are preferably curved as shown in Figure 7. The curved face  
23    has several important advantages. Firstly, it contacts a greater

1 area of a wheel, such as wheel 26 shown in Figure 2. Increased  
2 contact forces the halves 24 and 25 outwardly so that an outer  
3 portion 30 and 31 rubs against the carrier plates 18 and 19.  
4 Halves 24 and 25 are rotatably supported by an axle 32 and are  
5 free to move in and out along axle 32, as well as to freely  
6 rotate thereon. (see Fig. 7) The axle may be shaped so that it  
7 can't turn with respect to the carrier plates 18 and 19. This  
8 can be accomplished by anti-rotational geometry wherein the bolt  
9 is recessed into a non-circular recess in the carrier plates. It  
10 can also be accomplished by screws or rivets.

11 Referring to Figure 2, the carrier plate is a pivoted  
12 carrier plate 34 which is supported by a pivot 35, which is  
13 supported around protrusion 36. The elongated openings 33 are  
14 vertically oriented and the carrier plates are shown in an upward  
15 or braking configuration in Figure 2. There is, of course, an  
16 identical carrier plate 34 on the other side of the inline skate  
17 of Figure 2.

18 A tension member 41 may be a cable or spoke which is  
19 assigned to the back of a collar 37 which is pivotally supported  
20 by pivots 38 held by boot 11. As collar 37 moves back, tension  
21 member 41 lifts upwardly lifting carrier plates 34 pivotally  
22 upwardly so that diabolos 23 contact wheels 26, 27, and 28. When  
23 collar 37 is in its forward normal position, carrier plates 34

1 are lowered so that diabolos 23 do not contact wheels 26, 27, and  
2 28. There is preferably no contact between a diablo and front  
3 wheel 29. The tension member may be configured as a force  
4 applying member, such as a spoke, which would be configured to  
5 transmit a downward movement of the back of a collar to the  
6 carriers.

7 Turning now to Figure 3, the carrier plates are indicated by  
8 reference character 39 and have horizontally aligned openings 40,  
9 which are likewise supported by protrusions 15. A cable is shown  
10 in a braking position 41 in Figure 3 and in a normal riding  
11 position 41'.

12 When the collar 37 is in a braking position, the carrier  
13 plates 39 are moved rearwardly so that the diabolos 23 contact  
14 wheels 26, 27 and 28 and are spread apart in the manner indicated  
15 in Figure 7. When collar 37 is in a non-braking position, a  
16 return spring 42 urges the carrier plates 39 forwardly so that  
17 they are free of contact with wheels 26, 27, and 28.

18 An especially preferred diablo configuration is shown in  
19 Figures 5 and 6 where the diablo is indicated by reference  
20 character 43. Diabolo 43 has a one piece elastomeric or  
21 polymeric body 44 which is flexible enough to be moved outwardly  
22 by contact with the wheel 26. As it moves outwardly, the  
23 frictional rings 45 and 46 abut the carrier plates 19 and 18,

1        respectively. There is a further braking action caused by the  
2        curved shape of the diabolo. It is to be understood that the  
3        outer peripheral edge 47 of wheel 26 moves at a faster linear  
4        speed than a more inwardly positioned portion 48. Since the  
5        diameter of the wheel is much greater than the diameter of the  
6        diabolo, these relative speeds change so that there is a rubbing  
7        action caused by the mating of the wheel with the curved surface  
8        of the diabolo. This rubbing action provides additional braking  
9        force and the heat from this braking force is readily dissipated  
10       by the large surface of the wheel especially when the wheel is in  
11       contact with a skating surface cooler than itself. The result is  
12       a more efficient and less likely to overheat brake. A steel  
13       hollow cylindrical axle 48 reduces the rotational friction of  
14       diabolo 43 around an axle. The elastomeric or polymeric body may  
15       be fabricated from polyurethane, rubber, polytetrafluoro  
16       ethylene, polyetheretherketone, polyetheretherimide and phenolic  
17       based resins.

18       A braking assembly using a pair of levers 50 is shown in  
19       Figure 4. A split carrier pivot 51 supports levers 50 with  
20       respect to the frame halves 13 and 14 not shown in Figure 4, but  
21       analogous to that shown in Figure 1. The elastomeric body may be  
22       fabricated from polyurethane or rubber. The curved shape of the



1 inner portion of the diabolo may be elliptical, round, parabolic,  
2 hyperbolic, or poly curved.

3 A diabolo 52 shown in phantom view is supported by an axle  
4 53 held in elongated opening 54. Levers 50 are moved up and down  
5 by the connection of rod 55 with a spoke or other rigid member  
6 attached to collar 37 in a manner known to those skilled in the  
7 art. As the collar is pivoted rearwardly, rod 55 moves  
8 downwardly forcing diabolo 52 against wheels 56 and 57. As shown  
9 by comparing Figures 2, 3, and 4, the diabolos may be above, at,  
10 or below the level of the axles of the wheels of the inline  
11 skate.

12 The present embodiments of this invention are thus to be  
13 considered in all respects as illustrative and not restrictive;  
14 the scope of the invention being indicated by the appended claims  
15 rather than by the foregoing description. All changes which come  
16 within the meaning and range of equivalency of the claims are  
17 intended to be embraced therein.